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Indian Standard
RECOMMENDED CURRENT RATINGS FOR CABLES
PART 1 PAPER-INSULATED LEAD-SHEATHED CABLES

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

Gr 8 *November* 1967

Indian Standard

RECOMMENDED CURRENT RATINGS FOR CABLES

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Indian Standard
RECOMMENDED CURRENT RATINGS FOR CABLES
PART I PAPER-INSULATED LEAD-SHEATHED CABLES

0. FOREWORD

0.1 This Indian Standard (Part I) was adopted by the Indian Standards Institution on 26 June 1967, after the draft finalized by the Conductors and Cables Sectional Committee had been approved by the Electrotechnical Division Council.

0.2 This standard has been drawn up to provide to the users general guidance for loading of cables. The over-loading of cables will reduce the life expectancy of the cable and at the same time under-loading it will mean uneconomic utilization of its capacity. Depending upon the loading cycle met with in practice, the installation engineer may decide the economic loading of cables.

0.3 The current ratings given in the standard have been drawn up on certain assumptions pertaining to soil conditions prevalent in this country, permissible temperature-rise of insulating materials, conductor, etc. It is, however, to be expected that these conditions may be somewhat different in different places in a vast country like ours. In such cases the installation engineer is expected to keep in mind the loading conditions, the soil and atmospheric conditions in the area, etc, before deciding on the choice of the proper size of cable.

0.4 For cables laid direct and in underground ducts, ratings have been provided corresponding to the value for the thermal resistivity of the soil as 150°C cm/W as agreed to by IEC for tropical climates. This covers the value commonly encountered in India, but ratings corresponding to other values can be determined from rating factors given in Tables 33 and 34. It is, however, emphasized that actual measurements of soil thermal resistivity at the proposed depth of laying should be made along the route prior to laying the cables where practicable and the cable ratings based upon the values so determined.

0.5 The permissible current ratings have been specified for three commonly adopted conditions of installation, namely, laid direct in ground, laid in ducts, and for cables in air.

0.6 This is one of the series of Indian Standards on recommended current ratings for various types of cables. Others in the series are:

IS : 3961 (Part II)-1967 Recommended current ratings for cables: Part II PVC insulated and PVC sheathed heavy duty cables

IS : 3961 (Part III)-1968 Recommended current ratings for cables: Part III Rubber insulated cables

IS : 3961 (Part IV)-1968 Recommended current ratings for cables: Part IV Polythene insulated cables

IS : 3961 (Part V)-1968 Recommended current ratings for cables: Part V PVC insulated light duty cables and wires

0.7 In preparing this standard, assistance has been derived from the following:

ERA Report No. F/T 183 Current ratings for paper insulated cables to BS 480 : 1954 and Varnished-cambric insulated cables to BS 608 : 1955. British Electrical and Allied Industries Research Association, U.K.

IEE Wiring regulations. Institute of Electrical Engineers, U.K.

0.8 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard (Part I) covers recommended current ratings for paper-insulated lead-sheathed cables covered by IS : 692-1973†, either laid direct in ground, in ducts or in air.

2. BASIC ASSUMPTIONS

2.1 The current ratings given in Tables 1 to 20 in the standard are based on the following assumptions:

a) *Maximum Conductor Temperature* — The maximum conductor temperatures assumed for various voltage classes and types of cables

---

*Rules for rounding off numerical values (*revised*).

†Specification for paper insulated lead-sheathed cables for electricity supply (*second revision*).

are given in the following table:

Voltage	*Type*	*Maximum Conductor Temperature* °C
i) 1·1 kV cables	Single-core	80
	Twin and multi-core (belted)	80
ii) 3·3 and 6·6 kV cables	Single-core	80
	Three-core (belted)	80
iii) 11 kV cables	Single-core	70
	Three-core (belted)	65
	Three-core (screened)	70
iv) 22 kV cables	Single-core	65
	Three-core (screened) and three-core SL	65
v) 33 kV cables	Single-core	65
	Three-core (screened) and three-core SL	65

NOTE — Unarmoured cables laid direct in ducts are subjected to additional regulations that maximum permissible temperature-rise above ambient shall not exceed the following:

1·1, 3·3 and 6·6 kV cables	45°C
11, 22 and 33 kV cables	35°C

b) *Thermal Resistivity of Soil* 150°C cm/W

c) *Ground Temperature* 30°C

d) *Ambient Air Temperature* 40°C

e) *Depth of Laying* — to the highest point of cables laid direct or to top surface of ducts, is taken to be as follows:

1·1 kV cables	750 mm
3·3, 6·6 and 11 kV cables	900 mm
22 and 32 kV cables	1 050 mm

NOTE — In the case of twin and multi-core cables (except SL cables) with conductors of sizes 25 mm² and above, the current ratings given are for sector shaped conductors. For round conductors, the current ratings would be somewhat lower.

3. METHODS OF INSTALLATION

3.1 The current ratings given in this standard are for methods of installation as given in the following table:

Type of Cable	*Type of Installation*	*Method of Installation*
Single-core	a) Laid direct in the ground	i) Three in trefoil groups touching, or ii) Two in horizontal formation touching

Type of Cable	*Type of Installation*	*Method of Installation*
Single-core (*contd*)	b) In ducts	i) Three in trefoil ducts, or
		ii) Two in horizontal formation
	c) In air	i) Two single-core cables installed one above the other fixed to a vertical wall as follows, the distance between the wall and the surface of the cable being 25 mm in each case: 1) Cables of sizes up to and including 185 mm^2 are installed at a distance between centres of twice the overall diameter of the cable 2) Cables of sizes 225 mm^2 and above are installed at a distance between centres of 90 mm NOTE — The ratings for two cables may be applied with safety in cases where such cables are installed in horizontal formation, on brackets fixed to a wall, either spaced as indicated above or touching throughout.
		ii) Three single-core cables in trefoil groups touching
Twin and multi-core		Installed singly

4. SIZES OF THE DUCTS

4.1 The current ratings specified in the tables apply to cables laid in ducts of inner diameter, 100, 125 and 150 mm and are based on the use of earthenware ducts with a thermal resistivity of 120°C cm/W. They, however, apply with sufficient accuracy to fibre ducts and cast iron pipes. The latter will not be used for individual single-core cables on ac systems.

5. RATING FACTORS

5.1 The current ratings given in the respective tables apply to continuous loading of cables under the specific conditions of installation mentioned in **2.1**, **3.1** and **4.1**. For the various rating factors which may have to be used under different conditions, reference shall be made to tables as shown below:

	Ref to Table No.
a) *Cables Laid Direct in the Ground*	
i) For depth of laying	21
ii) For variation in ground temperature	22
iii) For variation in thermal resistivity of soil	23 and 24
iv) For group rating factors	25, 26, 27 and 28
b) *Cables Installed in Ducts*	
i) For depth of laying	29
ii) For variation in ground temperature	30 and 31
iii) For variation in thermal resistivity of soil	32 and 33
iv) For cables in multi-way ducts	34 and Fig. 1
v) For group rating factors	35, 36, 37 and 38
c) *Cables Installed in Air*	
i) For three unarmoured single-core cables in flat formation in air	39
ii) For variation in ambient air temperature	40

6. EFFECT OF GROUPING OF CABLES IN AIR

6.1 For cables of sizes up to 70 mm^2, no reduction in rating need be applied provided that the circuits are run with a clearance of at least 7·5 cm; and provided that if the number of circuits exceeds three, they are installed in a horizontal plane. For cables of sizes above 70 mm^2 no reduction in rating need be applied provided that the circuits are run with a clearance of at least 15 cm; and provided that if the number of circuits exceeds four, they are installed in a horizontal plane.

TABLE 1 CURRENT RATINGS (ac AND dc) FOR PAPER-INSULATED ARMOURED SERVED TWIN BELTED LEAD-COVERED 1·1 kV CABLES

(*Clause* 2.1)

NOMINAL AREA OF CONDUCTOR	DIRECT IN THE GROUND				IN SINGLE-WAY DUCTS				IN AIR			
	Direct Current		Alternating Current		Direct Current		Alternating Current		Direct Current		Alternating Current	
	Copper	Aluminium	Copper	Aluminium	Copper	Aluminium	Copper	Aluminium	Copper	Aluminium	Copper	Aluminium
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
mm²	A	A	A	A	A	A	A	A	A	A	A	A
6	57	45	57	45	51	41	51	41	53	41	53	41
10	77	61	77	61	68	54	68	54	71	56	71	56
16	100	79	100	79	89	69	89	69	93	74	93	74
25	125	98	125	98	120	90	120	90	120	97	120	97
35	155	120	155	120	140	110	140	110	150	115	150	115
50	190	150	190	150	165	130	165	130	190	145	190	145
70	230	180	230	180	205	160	205	160	235	185	235	185
95	270	210	270	210	240	190	240	190	280	220	280	220
120	310	240	310	240	280	215	275	210	325	255	320	255
150	355	275	345	270	315	245	310	240	375	220	370	290
185	405	315	395	310	365	280	350	275	430	340	420	335
225	450	355	440	345	405	315	390	310	490	385	475	375
240	470	370	455	355	420	325	405	320	510	400	495	390
300	530	415	500	400	475	370	445	355	590	460	570	440
400	620	480	570	455	570	440	520	415	710	560	670	530
500	700	540	630	510	640	500	570	465	820	650	740	600
625	820	640	700	590	740	590	630	520	980	770	850	710

NOTE — For basic assumptions and method of installation, *see* **2** and **3**.

TABLE 2 CURRENT RATINGS (ac AND dc) FOR PAPER-INSULATED UNARMOURED SERVED TWIN BELTED LEAD-COVERED 1·1 kV CABLES

(*Clause* 2.1)

NOMINAL AREA OF CONDUCTOR	DIRECT IN THE GROUND				IN SINGLE-WAY DUCTS				IN AIR			
	Direct Current		Alternating Current		Direct Current		Alternating Current		Direct Current		Alternating Current	
	Copper	Aluminium	Copper	Aluminium	Copper	Aluminium	Copper	Aluminium	Copper	Aluminium	Copper	Aluminium
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
mm^2	A	A	A	A	A	A	A	A	A	A	A	A
6	59	46	59	46	49	38	49	38	52	41	52	41
10	79	62	79	62	66	51	66	51	69	55	69	55
16	100	80	100	80	85	66	85	66	92	72	92	72
25	130	105	130	105	110	84	110	84	120	93	120	93
35	160	125	160	125	130	105	130	105	150	115	150	115
50	195	150	195	150	160	125	160	125	185	145	185	145
70	235	185	235	185	195	150	195	150	230	180	230	180
95	275	220	275	220	230	185	230	185	275	220	270	220
120	310	245	310	245	265	205	260	205	320	250	320	250
150	360	280	355	280	300	235	300	235	370	290	370	290
185	410	320	405	320	340	270	340	270	430	340	420	335
225	460	355	450	355	385	300	380	300	490	385	480	380
240	475	370	465	370	400	310	395	310	510	400	500	395
300	540	420	530	420	450	350	445	350	590	460	580	455
400	630	490	600	480	540	415	510	410	710	560	690	550
500	710	550	670	540	600	470	570	465	820	650	780	640
625	820	640	770	640	700	550	660	550	980	770	900	760

NOTE — For basic assumptions and method of installation, *see* **2** and **3**.

TABLE 3 CURRENT RATINGS (ac) FOR PAPAR-INSULATED ARMOURED SERVED THREE-, FOUR- AND FIVE-CORE BELTED LEAD-COVERED 1·1 kV CABLES

(*Clause* 2.1)

NOMINAL AREA OF CONDUCTOR	DIRECT IN GROUND		IN SINGLE-WAY DUCTS		IN AIR	
	Copper	Aluminium	Copper	Aluminium	Copper	Aluminium
(1)	(2)	(3)	(4)	(5)	(6)	(7)
mm²	A	A	A	A	A	A
6	47	37	42	34	44	35
10	64	51	57	45	60	48
16	82	65	74	58	78	62
25	105	85	95	74	105	81
35	130	100	115	88	125	98
50	155	125	140	110	160	125
70	190	150	170	135	200	155
95	220	175	200	160	235	190
120	255	195	230	180	275	220
150	290	225	260	200	320	255
185	335	260	295	230	370	290
225	370	290	330	260	420	330
240	385	300	345	270	440	345
300	425	340	385	305	490	390
400	485	390	435	350	580	460
500	530	420	470	380	640	520
625	570	475	510	430	730	610

NOTE — For basic assumptions and method of installation, *see* 2 and 3.

TABLE 4 CURRENT RATINGS (ac) FOR PAPER-INSULATED UNARMOURED SERVED THREE-, FOUR- AND FIVE-CORE BELTED LEAD-COVERED 1·1 kV CABLES

(*Clause* 2.1)

NOMINAL AREA OF CONDUCTOR	DIRECT IN GROUND		IN SINGLE-WAY DUCTS		IN AIR	
	Copper	Aluminium	Copper	Aluminium	Copper	Aluminium
(1)	(2)	(3)	(4)	(5)	(6)	(7)
mm²	A	A	A	A	A	A
6	48	38	41	32	43	34
10	64	51	55	43	59	46
16	83	66	70	55	77	60
25	110	85	91	71	105	81
35	130	100	110	85	125	98
50	160	125	135	105	160	125
70	200	155	165	130	200	155
95	230	185	195	155	235	185
120	265	205	225	175	275	220
150	300	245	255	200	320	255
185	345	270	290	225	370	295
225	385	305	320	250	420	335
240	400	315	330	260	440	350
300	440	350	365	290	500	395
400	500	400	430	345	600	480
500	560	455	485	395	670	550
625	620	520	530	440	780	650

NOTE — For basic assumptions and method of installation, *see* 2 and 3.

TABLE 5 CURRENT RATINGS (ac AND dc) FOR TWO PAPER-INSULATED SERVED SINGLE-CORE LEAD-COVERED 1·1 kV CABLES

(*Clause* 2.1)

NOMINAL AREA OF CONDUCTOR	DIRECT IN THE GROUND WITH SERVINGS TOUCHING				IN DUCTS						IN AIR			
	Direct Current Armoured or Unarmoured		Alternating Current Unarmoured		Direct Current Armoured		Direct Current Unarmoured		Alternating Current Unarmoured		Direct Current Armoured or Unarmoured		Alternating Current Unarmoured	
	Copper	Aluminium	Copper	Aluminium	Copper	Aluminium	Copper	Aluminium	Copper	Aluminium	Copper	Aluminium	Copper	Aluminium
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
mm²	A	A	A	A	A	A	A	A	A	A	A	A	A	A
6	64	50	64	50	61	48	58	45	58	45	59	47	59	47
10	86	67	86	67	83	65	76	59	76	59	81	63	81	63
16	110	84	110	84	105	83	100	79	100	79	105	84	105	84
25	140	115	140	115	140	110	130	105	130	105	140	115	140	115
35	165	130	165	130	165	130	155	125	155	125	175	135	175	135
50	205	155	205	155	200	155	190	150	190	150	215	170	215	170
70	250	190	250	190	245	190	230	180	230	180	270	210	270	210
95	290	230	290	230	290	230	270	210	270	210	325	250	325	250
120	330	265	330	265	330	255	310	240	305	240	380	300	380	300
150	380	300	380	300	380	290	360	280	350	275	440	350	440	350
185	430	340	425	335	425	330	410	315	395	310	510	400	510	400
225	480	380	470	370	470	370	455	350	430	340	580	455	570	450
240	500	395	490	385	490	385	470	365	445	350	600	475	590	470
300	570	450	550	440	560	440	530	415	490	390	690	540	680	540
400	670	520	640	510	650	510	630	485	560	445	830	660	810	640
500	760	580	700	570	730	580	710	540	600	495	950	750	920	750
625	880	680	780	650	840	660	820	640	660	560	1 120	880	1 060	880

NOTE — For basic assumptions and method of installation, *see* 2 and 3.

TABLE 6 CURRENT RATINGS (ac) FOR THREE PAPER-INSULATED UNARMOURED SERVED SINGLE-CORE LEAD-COVERED 1·1 kV CABLES

(*Clause* 2.1)

Nominal Area of Conductor	Trefoil Groups Laid Direct in the Ground with Servings Touching		In Trefoil Ducts		In Trefoil Groups in Air with Servings Touching	
	Copper	Aluminium	Copper	Aluminium	Copper	Aluminium
(1)	(2)	(3)	(4)	(5)	(6)	(7)
mm²	A	A	A	A	A	A
6	54	42	53	41	54	42
10	72	56	70	55	74	57
16	91	70	90	71	97	77
25	120	90	120	91	125	98
35	140	110	140	110	160	120
50	170	130	165	135	195	150
70	205	160	200	160	240	190
95	240	190	240	185	290	225
120	270	210	265	205	335	260
150	305	240	300	235	385	300
185	345	275	330	260	445	350
225	380	305	365	285	500	395
240	395	315	380	295	520	410
300	445	355	420	330	600	475
400	510	405	470	380	720	570
500	560	450	510	415	800	650
625	610	500	550	465	910	760

NOTE — For basic assumptions and method of installation, *see* **2** and **3**.

TABLE 7 CURRENT RATINGS (ac) FOR PAPER-INSULATED ARMOURED SERVED THREE-CORE BELTED LEAD-COVERED 3·3 AND 6·6 kV CABLES

(*Clause* 2.1)

Nominal Area of Conductor	Direct in the Ground		In Single-Way Ducts		In Air	
	Copper	Aluminium	Copper	Aluminium	Copper	Aluminium
(1)	(2)	(3)	(4)	(5)	(6)	(7)
mm²	A	A	A	A	A	A
16	83	65	74	58	81	64
25	110	85	95	74	110	84
35	130	105	115	89	130	105
50	160	125	140	110	165	130
70	190	150	175	135	205	155
95	230	180	205	160	240	190
120	255	200	225	180	275	220
150	290	225	260	200	320	255
185	330	260	295	230	370	295
225	365	290	330	260	420	335
240	380	300	340	270	440	350
300	420	330	380	300	500	395
400	475	380	430	345	590	465

NOTE — For basic assumptions and method of installation, *see* **2** and **3**.

TABLE 8 CURRENT RATINGS (ac) FOR PAPER-INSULATED UNARMOURED SERVED THREE-CORE BELTED LEAD-COVERED 3·3 AND 6·6 kV CABLES

(*Clause* 2.1)

NOMINAL AREA OF CONDUCTOR	DIRECT IN THE GROUND		IN SINGLE-WAY DUCTS		IN AIR	
	Copper	Aluminium	Copper	Aluminium	Copper	Aluminium
(1)	(2)	(3)	(4)	(5)	(6)	(7)
mm²	A	A	A	A	A	A
16	85	66	72	56	81	64
25	110	85	92	72	110	84
35	130	105	115	87	130	105
50	160	125	140	105	165	130
70	195	150	165	130	205	155
95	235	180	195	150	240	190
120	265	205	220	170	285	220
150	300	235	255	191	330	260
185	340	265	285	225	380	295
225	375	300	320	250	430	335
240	390	310	330	260	450	350
300	440	345	370	295	510	400
400	500	405	435	350	610	485

NOTE — For basic assumptions and method of installation, *see* **2** and **3**.

TABLE 9 CURRENT RATINGS (ac) FOR THREE PAPER-INSULATED UNARMOURED SERVED SINGLE-CORE LEAD-COVERED 3·3 AND 6·6 kV CABLES

(*Clause* 2.1)

NOMINAL AREA OF CONDUCTOR	TREFOIL GROUPS LAID DIRECT IN THE GROUND WITH SERVINGS TOUCHING		IN TREFOIL DUCTS		IN TREFOIL GROUPS IN AIR WITH SERVINGS TOUCHING	
	Copper	Aluminium	Copper	Aluminium	Copper	Aluminium
(1)	(2)	(3)	(4)	(5)	(6)	(7)
mm²	A	A	A	A	A	A
16	89	69	91	69	98	77
25	115	87	120	89	130	105
35	135	105	140	110	165	125
50	165	130	165	130	200	155
70	205	155	200	160	245	195
95	240	185	230	185	295	235
120	270	205	265	205	340	270
150	305	235	300	230	390	310
185	340	270	330	260	455	360
225	380	300	365	285	520	405
240	395	310	375	295	540	420
300	435	345	415	330	610	485
400	495	395	465	380	730	590
500	550	445	510	420	820	660
625	610	500	550	465	930	760

NOTE — For basic assumptions and method of installation, *see* **2** and **3**.

TABLE 10 CURRENT RATINGS (ac) FOR PAPER-INSULATED ARMOURED SERVED THREE-CORE BELTED LEAD-COVERED 11 kV CABLES

(*Clause* 2.1)

NOMINAL AREA OF CONDUCTOR	DIRECT IN THE GROUND		IN SINGLE-WAY DUCTS		IN AIR	
	Copper	Aluminium	Copper	Aluminium	Copper	Aluminium
(1)	(2)	(3)	(4)	(5)	(6)	(7)
mm²	A	A	A	A	A	A
16	70	58	64	49	65	50
25	92	72	82	64	87	68
35	110	84	95	74	105	80
50	135	105	120	92	130	100
70	165	130	145	115	160	125
95	195	155	170	135	195	155
120	215	170	190	155	215	175
150	250	190	225	175	250	200
185	280	220	255	200	290	230
225	305	240	280	220	330	260
240	315	250	290	225	345	275
300	355	280	320	250	395	310

NOTE — For Basic assumptions and method of installation, *see* 2 and 3.

TABLE 11 CURRENT RATINGS (ac) FOR PAPER-INSULATED UNARMOURED SERVED THREE-CORE BELTED LEAD-COVERED 11 kV CABLES

(*Clause* 2.1)

NOMINAL AREA OF CONDUCTOR	DIRECT IN THE GROUND		IN SINGLE-WAY DUCTS		IN AIR	
	Copper	Aluminium	Copper	Aluminium	Copper	Aluminium
(1)	(2)	(3)	(4)	(5)	(6)	(7)
mm²	A	A	A	A	A	A
16	72	55	64	50	64	50
25	92	72	83	64	83	65
35	110	84	99	77	105	79
50	135	105	125	94	130	100
70	165	130	150	115	160	125
95	195	155	170	135	195	155
120	215	170	190	150	215	175
150	250	190	215	170	250	200
185	285	220	250	195	295	230
225	320	250	285	225	330	265
240	330	260	295	235	345	275
300	375	300	335	265	395	315

NOTE — For basic assumptions and method of installation, *see* 2 and 3.

TABLE 12 CURRENT RATINGS (ac) FOR PAPER-INSULATED ARMOURED SERVED THREE-CORE SCREENED LEAD-COVERED OR THREE-CORE SL 11 kV CABLES

(*Clause* 2.1)

NOMINAL AREA OF CONDUCTOR	DIRECT IN THE GROUND		IN SINGLE-WAY DUCTS		IN AIR	
	Copper	Aluminium	Copper	Aluminium	Copper	Aluminium
(1)	(2)	(3)	(4)	(5)	(6)	(7)
mm^2	A	A	A	A	A	A
16	79	61	69	54	76	59
25	105	80	84	65	98	77
35	125	95	105	80	120	93
50	150	115	130	100	150	115
70	175	140	160	125	185	140
95	210	165	185	145	215	175
120	235	185	205	160	250	200
150	265	205	235	180	290	230
185	300	235	265	210	340	265
225	335	265	295	230	380	300
240	345	275	305	240	395	310
300	380	300	340	265	440	345

NOTE — For basic assumptions and method of installation, *see* 2 and 3.

TABLE 13 CURRENT RATINGS (ac) FOR PAPER-INSULATED UNARMOURED SERVED THREE-CORE SCREENED LEAD-COVERED 11 kV CABLES

(*Clause* 2.1)

NOMINAL AREA OF CONDUCTOR	DIRECT IN THE GROUND		IN SINGLE-WAY DUCTS		IN AIR	
	Copper	Aluminium	Copper	Aluminium	Copper	Aluminium
(1)	(2)	(3)	(4)	(5)	(6)	(7)
mm^2	A	A	A	A	A	A
16	79	60	65	51	76	59
25	105	73	84	66	98	77
35	125	92	100	77	120	93
50	150	115	120	94	150	115
70	180	140	150	115	185	140
95	215	165	175	135	215	175
120	240	185	195	155	250	200
150	270	210	225	175	290	230
185	310	245	255	200	340	265
225	345	275	285	225	385	300
240	355	285	295	235	400	315
300	395	310	335	265	455	355

NOTE — For basic assumptions and method of installation, *see* 2 and 3.

TABLE 14 CURRENT RATINGS (ac) FOR THREE PAPER-INSULATED UNARMOURED SERVED SINGLE-CORE LEAD-COVERED 11 kV CABLES

(*Clause* 2.1)

Nominal Area of Conductor	Trefoil Groups Laid Direct in the Ground with Servings Touching		In Trefoil Ducts		In Trefoil Groups in Air with Servings Touching	
	Copper	Aluminium	Copper	Aluminium	Copper	Aluminium
(1)	(2)	(3)	(4)	(5)	(6)	(7)
mm²	A	A	A	A	A	A
16	79	63	80	62	85	66
25	98	78	110	82	115	88
35	120	93	125	96	135	105
50	145	115	150	115	170	130
70	180	140	175	140	215	165
95	210	165	210	165	255	200
120	240	185	235	185	295	230
150	270	210	260	205	340	265
185	300	240	290	230	385	300
225	330	260	320	250	430	340
240	340	270	330	260	450	355
300	380	305	360	285	510	400
400	445	355	410	335	610	490
500	490	395	445	365	700	570
625	540	445	485	410	800	670

Note — For basic assumptions and method of installation, *see* 2 and 3.

TABLE 15 CURRENT RATINGS (ac) FOR PAPER-INSULATED ARMOURED SERVED THREE-CORE SCREENED LEAD-COVERED OR THREE-CORE SL 22 kV CABLES

(*Clause* 2.1)

Nominal Area of Conductor	Direct in the Ground		In Single-Way Ducts		In Air	
	Copper	Aluminium	Copper	Aluminium	Copper	Aluminium
(1)	(2)	(3)	(4)	(5)	(6)	(7)
mm²	A	A	A	A	A	A
25	92	72	84	66	92	72
35	115	88	100	79	115	88
50	140	105	120	97	140	105
70	165	130	150	120	170	130
95	195	155	180	140	200	160
120	215	170	200	155	235	180
150	250	190	225	175	265	210
185	280	220	255	205	310	245
225	310	240	280	225	345	275
240	320	250	290	230	360	285
300	355	275	325	255	400	320

Note — For basic assumptions and method of installation, *see* 2 and 3.

TABLE 16 CURRENT RATINGS (ac) FOR PAPER-INSULATED UNARMOURED SERVED THREE-CORE SCREENED LEAD-COVERED 22 kV CABLES

(*Clause* 2.1)

NOMINAL AREA OF CONDUCTOR	DIRECT IN THE GROUND		IN SINGLE-WAY DUCTS		IN AIR	
	Copper	Aluminium	Copper	Aluminium	Copper	Aluminium
(1)	(2)	(3)	(4)	(5)	(6)	(7)
mm²	A	A	A	A	A	A
25	92	73	81	62	92	73
35	110	87	99	76	110	87
50	135	105	120	94	135	105
70	165	130	150	115	170	130
95	195	150	170	135	200	155
120	225	175	195	150	235	180
150	255	200	220	170	270	215
185	285	225	250	200	310	245
225	320	250	280	220	350	280
240	330	260	290	230	365	290
300	370	285	325	255	410	325

NOTE — For basic assumptions and method of installation, *see* 2 and 3.

TABLE 17 CURRENT RATINGS (ac) FOR THREE PAPER-INSULATED UNARMOURED SERVED SINGLE-CORE LEAD-COVERED 22 kV CABLES

(*Clause* 2.1)

NOMINAL AREA OF CONDUCTOR	DIRECT IN THE GROUND		IN TREFOIL DUCTS		IN AIR	
	Copper	Aluminium	Copper	Aluminium	Copper	Aluminium
(1)	(2)	(3)	(4)	(5)	(6)	(7)
mm²	A	A	A	A	A	A
16	75	59	79	62	78	61
25	94	74	105	82	105	82
35	115	87	120	95	130	99
50	140	105	145	115	155	125
70	170	130	170	135	195	150
95	200	155	205	160	230	180
120	225	175	230	180	265	205
150	255	200	255	200	305	240
185	285	225	285	225	350	275
225	320	255	315	245	395	310
240	330	265	325	255	410	325
300	370	295	360	285	465	370
400	420	335	400	325	560	415
500	455	370	435	360	620	500
625	510	420	470	405	710	590

NOTE — For basic assumptions and method of installation, *see* 2 and 3.

TABLE 18 CURRENT RATINGS (ac) FOR PAPER-INSULATED ARMOURED SERVED THREE-CORE SCREENED LEAD-COVERED OR THREE-CORE SL 33 kV CABLES

(*Clause* 2.1)

Nominal Area of Conductor	Direct in the Ground		In Single-Way Ducts		In Air	
	Copper	Aluminium	Copper	Aluminium	Copper	Aluminium
(1)	(2)	(3)	(4)	(5)	(6)	(7)
mm²	A	A	A	A	A	A
70	165	130	150	120	170	135
95	195	155	180	140	205	160
120	215	170	200	155	235	180
150	245	190	225	175	265	210
185	275	220	255	200	305	240
225	300	240	285	220	345	275
240	310	245	295	230	360	285
300	345	270	325	255	400	320

Note — For basic assumptions and method of installation, *see* 2 and 3.

TABLE 19 CURRENT RATINGS (ac) FOR PAPER-INSULATED UNARMOURED SERVED THREE-CORE SCREENED LEAD-COVERED 33 kV CABLES

(*Clause* 2.1)

Nominal Area of Conductor	Direct in the Ground		In Single-Way Ducts		In Air	
	Copper	Aluminium	Copper	Aluminium	Copper	Aluminium
(1)	(2)	(3)	(4)	(5)	(6)	(7)
mm²	A	A	A	A	A	A
70	165	130	145	115	170	135
95	195	155	175	135	205	160
120	215	170	195	150	235	180
150	250	190	220	170	270	215
185	280	220	245	195	310	245
225	310	245	275	215	350	275
240	320	255	285	225	365	285
300	360	285	320	250	410	325

Note — For basic assumptions and method of installation, *see* 2 and 3.

TABLE 20 CURRENT RATINGS (ac) FOR THREE PAPER-INSULATED UNARMOURED SERVED SINGLE-CORE LEAD-COVERED 33 kV CABLES

(*Clause* 2.1)

NOMINAL AREA OF CONDUCTOR	TREFOIL GROUPS LAID DIRECT IN THE GROUND WITH SERVINGS TOUCHING		IN TREFOIL DUCTS		IN TREFOIL GROUPS IN AIR WITH SERVINGS TOUCHING	
	Copper	Aluminium	Copper	Aluminium	Copper	Aluminium
(1)	(2)	(3)	(4)	(5)	(6)	(7)
mm^2	A	A	A	A	A	A
70	165	130	175	135	195	150
95	195	155	205	160	230	180
120	220	175	230	180	265	205
150	250	195	255	200	305	240
185	280	225	285	225	350	275
225	310	240	315	245	395	310
240	320	255	325	255	410	325
300	360	290	355	280	465	370
400	415	330	400	325	560	445
500	455	365	435	360	620	500
625	500	415	475	400	710	590

NOTE — For basic assumptions and method of installation, *see* **2** and **3**.

TABLE 21 RATING FACTORS FOR DEPTH OF LAYING (FOR CABLES LAID DIRECT IN THE GROUND)

[*Clause* 5.1 (a) (i)]

DEPTH OF LAYING	CABLES FOR VOLTAGES				
	Up to and Including 1·1 kV			3·3 kV, 6·6 kV and 11 kV All Sizes	22 kV and 33 kV All Sizes
cm	Up to 25 mm^2	Above 25 mm^2 up to 300 mm^2	Above 300 mm^2		
(1)	(2)	(3)	(4)	(5)	(6)
75	1·00	1·00	1·00	—	—
90	0·99	0·98	0·97	1·00	—
105	0·98	0·97	0·96	0·99	1·00
120	0·97	0·96	0·95	0·98	0·99
150	0·96	0·94	0·92	0·96	0·97
180 or more	0·95	0·93	0·91	0·95	0·96

TABLE 22 RATING FACTORS FOR VARIATION IN GROUND TEMPERATURE (FOR CABLES LAID DIRECT IN THE GROUND)

[*Clause* 5.1 (a) (ii)]

MAXIMUM CONDUCTOR TEMPERATURE °C	GROUND TEMPERATURE °C						
	15	20	25	30	35	40	45
80	1·11	1·10	1·05	1·0	0·95	0·89	0·84
70	1·17	1·12	1·06	1·0	0·94	0·87	0·79
65	1·20	1·13	1·07	1·0	0·93	0·85	0·76

TABLE 23 RATING FACTORS FOR VARIATION IN THERMAL RESISTIVITY OF SOIL (TWIN AND MULTI-CORE CABLES LAID DIRECT IN THE GROUND)

[*Clause* 5.1 (a) (iii)]

NOMINAL AREA OF CONDUCTOR mm²	RATING FACTORS FOR VALUE OF THERMAL RESISTIVITY OF SOIL IN °C cm/W					
	100	120	150	200	250	300
6	1·10	1·05	1·0	0·92	0·86	0·81
10	1·10	1·06	1·0	0·92	0·85	0·80
16	1·12	1·06	1·0	0·91	0·84	0·79
25	1·14	1·08	1·0	0·91	0·84	0·78
35	1·15	1·08	1·0	0·91	0·84	0·77
50	1·15	1·08	1·0	0·91	0·84	0·77
70	1·15	1·08	1·0	0·90	0·83	0·76
95	1·15	1·08	1·0	0·90	0·83	0·76
120	1·17	1·09	1·0	0·90	0·82	0·76
150	1·17	1·09	1·0	0·90	0·82	0·76
185	1·18	1·09	1·0	0·89	0·81	0·75
225	1·18	1·09	1·0	0·89	0·81	0·75
240	1·18	1·09	1·0	0·89	0·81	0·75
300	1·18	1·09	1·0	0·89	0·81	0·75
400	1·19	1·10	1·0	0·89	0·81	0·75
500	1·21	1·10	1·0	0·89	0·81	0·75
625	1·22	1·10	1·0	0·89	0·81	0·74

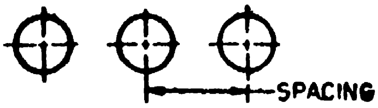
TABLE 24 RATING FACTORS FOR VARIATION IN THERMAL RESISTIVITY OF SOIL, TWO AND THREE SINGLE-CORE CABLES LAID DIRECT IN THE GROUND

[*Clause* 5.1 (a) (iii)]

NOMINAL AREA OF CONDUCTOR	TWO CABLES TOUCHING, FOR VALUES OF THERMAL RESISTIVITY OF SOIL IN °C cm/W						THREE CABLES IN TREFOIL TOUCHING, FOR VALUES OF THERMAL RESISTIVITY OF SOIL IN °C cm/W					
	100	200	150	200	250	300	100	200	150	200	250	300
mm²												
6	1·15	1·08	1·00	0·91	0·84	0·78	1·16	1·09	1·00	0·90	0·82	0·76
10	1·15	1·08	1·00	0·90	0·83	0·77	1·18	1·09	1·00	0·89	0·81	0·75
16	1·17	1·09	1·00	0·90	0·83	0·77	1·19	1·09	1·00	0·89	0·81	0·74
25	1·18	1·09	1·00	0·90	0·82	0·76	1·19	1·09	1·00	0·88	0·80	0·74
35	1·18	1·09	1·00	0·90	0·82	0·75	1·20	1·09	1·00	0·88	0·80	0·74
50	1·18	1·09	1·00	0·90	0·82	0·75	1·20	1·09	1·00	0·88	0·80	0·74
70	1·19	1·09	1·00	0·89	0·81	0·74	1·21	1·10	1·00	0·88	0·80	0·74
95	1·19	1·09	1·00	0·89	0·81	0·74	1·22	1·10	1·00	0·68	0·80	0·74
120	1·21	1·10	1·00	0·89	0·80	0·74	1·22	1·10	1·00	0·88	0·79	0·74
150	1·21	1·10	1·00	0·89	0·80	0·74	1·22	1·10	1·00	0·88	0·79	0·73
185	1·21	1·10	1·00	0·89	0·80	0·74	1·22	1·10	1·00	0·88	0·79	0·73
225	1·21	1·10	1·00	0·89	0·80	0·74	1·22	1·10	1·00	0·88	0·79	0·73
240	1·21	1·10	1·00	0·89	0·80	0·74	1·22	1·10	1·00	0·88	0·79	0·73
300	1·21	1·10	1·00	0·89	0·80	0·74	1·22	1·10	1·00	0·88	0·79	0·72
400	1·21	1·10	1·00	0·88	0·80	0·74	1·22	1·11	1·00	0·88	0·79	0·72
500	1·21	1·10	1·00	0·88	0·80	0·74	1·24	1·11	1·00	0·88	0·79	0·72
625	1·22	1·10	1·00	0·88	0·80	0·74	1·24	1·11	1·00	0·88	0·79	0·72

TABLE 25 GROUP RATING FACTORS FOR TWIN AND MULTI-CORE CABLES IN HORIZONTAL FORMATION LAID DIRECT IN THE GROUND

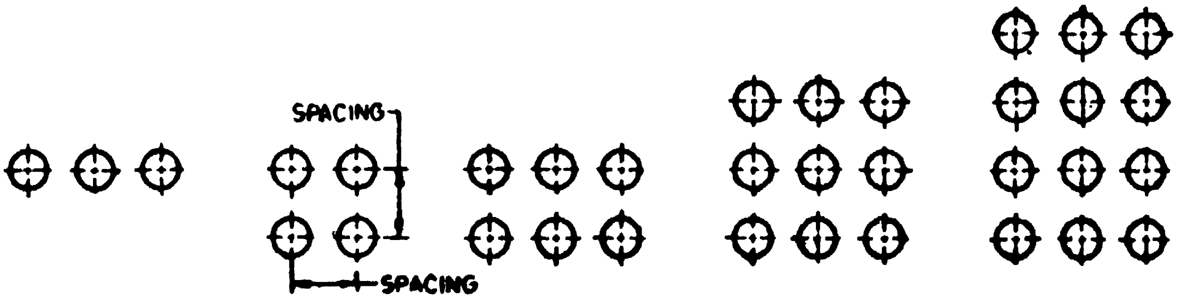
[*Clause* 5.1 (a) (iv)]



Number of Cables in Group	Spacing for Cables									
	1·1 to 22 kV					33 kV				
	Touching	15 cm	30 cm	45 cm	60 cm	Touching	15 cm	30 cm	45 cm	60 cm
2	0·79	0·82	0·87	0·90	0·91	0·80	0·83	0·86	0·88	0·90
3	0·69	0·75	0·79	0·83	0·86	0·69	0·72	0·76	0·80	0·83
4	0·62	0·69	0·74	0·79	0·82	0·63	0·66	0·72	0·76	0·79
5	0·58	0·65	0·72	0·76	0·80	0·58	0·62	0·68	0·72	0·76
6	0·54	0·61	0·69	0·75	0·78	0·55	0·59	0·65	0·70	0·74
7	0·52	0·59	0·68	0·73	0·77	0·52	0·56	0·63	0·68	0·73
8	0·50	0·57	0·66	0·72	0·76	0·50	0·54	0·62	0·67	0·72
9	0·47	0·55	0·64	0·71	0·75	0·48	0·52	0·60	0·66	0·71
10	0·46	0·54	0·63	0·70	0·74	0·46	0·51	0·59	0·65	0·70
11	0·45	0·53	0·63	0·69	0·74	0·45	0·50	0·58	0·65	0·70
12	0·44	0·52	0·62	0·68	0·73	0·44	0·49	0·57	0·64	0·69

TABLE 26 GROUP RATING FACTORS FOR TWIN AND MULTI-CORE CABLES IN TIER FORMATION, LAID DIRECT IN THE GROUND (FOR 1·1 to 33 kV CABLES)

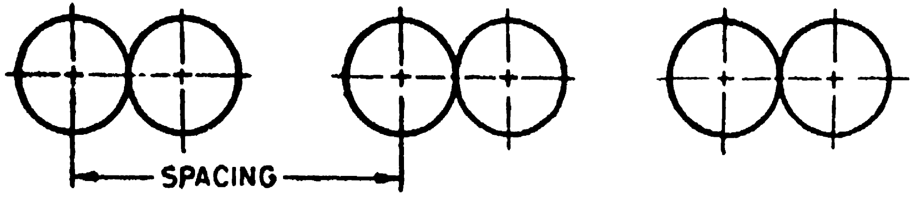
[*Clause* 5.1 (a) (iv)]



Number of Cables in Group	Spacing									
	Touching		15 cm		30 cm		45 cm		60 cm	
	Up to 22 kV cables	33 kV cables	Up to 22 kV cables	33 kV cables	Up to 22 kV cables	33 kV cables	Up to 22 kV cables	33 kV cables	Up to 22 kV cables	33 kV cables
2	0·81	—	0·84	—	0·88	—	0·90	—	0·91	—
3	0·69	—	0·73	—	0·79	—	0·82	—	0·85	—
4	0·60	0·61	0·67	0·64	0·73	0·69	0·76	0·72	0·78	0·74
5	0·55	—	0·61	—	0·67	—	0·71	—	0·73	—
6	0·51	0·52	0·57	0·55	0·63	0·60	0·67	0·69	0·69	0·65
7	0·48	—	0·54	—	0·59	—	0·63	—	0·64	—
8	0·45	—	0·51	—	0·57	—	0·59	—	0·61	—
9	0·44	0·43	0·48	0·46	0·54	0·50	0·56	0·53	0·58	0·56
10	0·42	—	0·46	—	0·51	—	0·54	—	0·56	—
11	0·41	—	0·45	—	0·50	—	0·53	—	0·55	—
12	0·40	0·48	0·45	0·41	0·49	0·45	0·52	0·48	0·54	0·51

TABLE 27 GROUP RATING FACTORS FOR CIRCUITS OF TWO SINGLE-CORE CABLES SIDE BY SIDE AND TOUCHING, HORIZONTAL FORMATION, LAID DIRECT IN THE GROUND

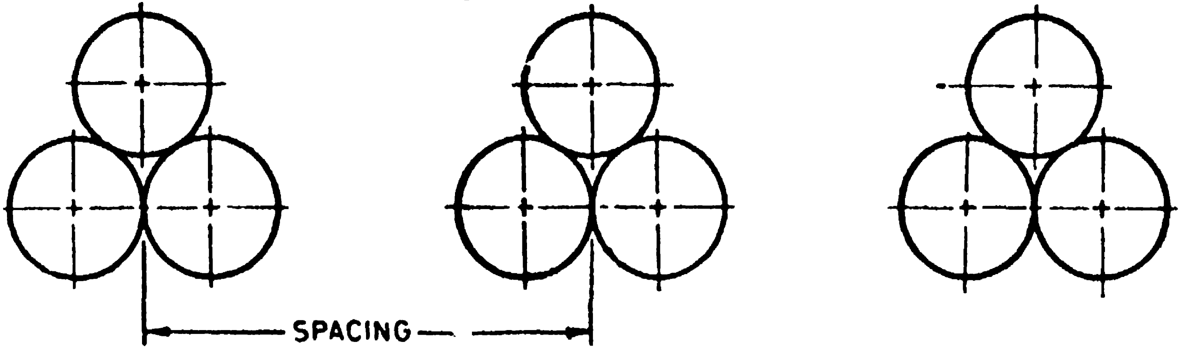
[*Clause* 5.1 (a) (iv)]



Number of Circuits (of Two Cables) in Group	Spacing				
	Touching	15 cm	30 cm	45 cm	60 cm
2	0·79	0·86	0·91	0·93	0·95
3	0·69	0·78	0·84	0·88	0·91
4	0·64	0·73	0·81	0·86	0·88
5	0·59	0·70	0·79	0·84	0·87
6	0·56	0·67	0·79	0·83	0·87
7	0·53	0·66	0·76	0·82	0·86
8	0·51	0·65	0·75	0·82	0·86
9	0·49	0·64	0·74	0·81	0·85
10	0·48	0·63	0·74	0·81	0·85
11	0·46	0·62	0·73	0·80	0·85
12	0·45	0·62	0·73	0·80	0·85

TABLE 28 GROUP RATING FACTORS FOR CIRCUITS OF THREE SINGLE-CORE CABLES IN TREFOIL AND TOUCHING, HORIZONTAL FORMATION, LAID DIRECT IN THE GROUND

[*Clause* 5.1 (a) (iv)]



Number of Circuits (of Three Cables) in Group	Spacing for Cables									
	1·1 to 22 kV					33 kV				
	Touching	15 cm	30 cm	45 cm	60 cm	Touching	15 cm	30 cm	45 cm	60 cm
2	0·78	0·81	0·85	0·88	0·90	0·80	0·82	0·85	0·88	0·90
3	0·68	0·71	0·77	0·81	0·83	0·68	0·71	0·76	0·79	0·82
4	0·61	0·65	0·72	0·76	0·79	0·62	0·65	0·71	0·75	0·79
5	0·56	0·61	0·68	0·73	0·77	0·57	0·60	0·67	0·72	0·75
6	0·53	0·58	0·66	0·71	0·76	0·54	0·57	0·64	0·69	0·74
7	0·50	0·55	0·64	0·69	0·74	0·51	0·55	0·62	0·67	0·72
8	0·48	0·54	0·62	0·67	0·72	0·49	0·53	0·60	0·66	0·71
9	0·46	0·52	0·61	0·67	0·72	0·47	0·51	0·59	0·65	0·70
10	0·45	0·51	0·60	0·67	0·72	0·46	0·50	0·58	0·64	0·69
11	0·44	0·50	0·59	0·66	0·71	0·44	0·49	0·57	0·63	0·68
12	0·43	0·49	0·59	0·66	0·71	0·43	0·48	0·56	0·63	0·68

TABLE 29 RATING FACTORS FOR DEPTH OF LAYING (TWIN AND MULTI-CORE CABLES IN SINGLE-WAY DUCTS)

[*Clause* 5.1 (b) (i)]

DEPTH OF LAYING	1·1 kV CABLES	3·3, 6·6 AND 11 kV CABLES	22 AND 33 kV CABLES
cm			
75	1·00	—	—
90	0·99	1·00	—
105	0·98	0·99	1·00
120	0·97	0·98	0·99
150	0·96	0·97	0·98
180	0·95	0·96	0·97
270	0·92	0·93	0·94
360	0·91	0·92	0·92
450	0·90	0·91	0·91
540 or more	0·89	0·90	0·90

TABLE 30 RATING FACTORS FOR VARIATION IN GROUND TEMPERATURE (FOR ARMOURED CABLES IN DUCTS)

[*Clause* 5.1 (b) (ii)]

MAXIMUM CONDUCTOR TEMPERATURE	GROUND TEMPERATURE °C						
	15	20	25	30	35	40	45
°C							
80	1·14	1·10	1·05	1·0	0·95	0·89	0·84
70	1·17	1·12	1·06	1·0	0·94	0·87	0·79
65	1·20	1·13	1·07	1·0	0·93	0·85	0·76

TABLE 31 RATING FACTORS FOR VARIATION IN GROUND TEMPERATURE (FOR UNARMOURED CABLES IN DUCTS)

[*Clause* 5.1 (b) (ii)]

MAXIMUM CONDUCTOR TEMPERATURE °C	GROUND TEMPERATURE °C						
	15	20	25	30	35	40	45
80	1·00	1·00	1·00	1·00	1·00	0·94	0·88
70	1·00	1·00	1·00	1·00	1·00	0·93	0·85
65	1·00	1·00	1·00	1·00	0·93	0·85	0·76

TABLE 32 RATING FACTORS FOR VARIATION IN THERMAL RESISTIVITY OF SOIL (TWIN AND MULTI-CORE CABLES IN SINGLE-WAY DUCTS)

[*Clause* 5.1 (b) (iii)]

NOMINAL AREA OF CONDUCTOR mm²	RATING FACTORS FOR VALUES OF THERMAL RESISTIVITY OF SOIL IN °C cm/W					
	100	120	150	200	250	300
6	1·05	1·03	1·00	0·96	0·91	0·88
10	1·05	1·03	1·00	0·95	0·90	0·87
16	1·06	1·03	1·00	0·95	0·90	0·86
25	1·07	1·04	1·00	0·95	0·90	0·85
35	1·08	1·04	1·00	0·94	0·89	0·84
50	1·08	1·04	1·00	0·94	0·89	0·84
70	1·08	1·04	1·00	0·94	0·88	0·83
95	1·08	1·04	1·00	0·94	0·87	0·83
120	1·09	1·05	1·00	0·94	0·87	0·82
150	1·09	1·05	1·00	0·93	0·86	0·82
185	1·10	1·05	1·00	0·93	0·86	0·81
225	1·10	1·05	1·00	0·93	0·86	0·81
240	1·10	1·05	1·00	0·92	0·86	0·81
300	1·10	1·05	1·00	0·92	0·86	0·81
400	1·11	1·06	1·00	0·92	0·86	0·81
500	1·12	1·06	1·00	0·92	0·86	0·81
625	1·12	1·06	1·00	0·92	0·85	0·80

TABLE 33 RATING FACTORS FOR VARIATION IN THERMAL RESISTIVITY OF SOIL (TWO AND THREE SINGLE-CORE CABLES IN DUCTS)

[*Clauses* 0.4 *and* 5.1 (b) (iii)]

Nominal Area of Conductor	Two Cables in Two-Way Ducts, for Values of Thermal Resistivity of Soil in °C cm/W						Three Cables in Trefoil Ducts, for Values of Thermal Resistivity of Soil in °C cm/W					
	100	120	150	200	250	300	100	120	150	200	250	300
mm²												
6	1·07	1·04	1·00	0·96	0·91	0·86	1·10	1·05	1·00	0·94	0·87	0·83
10	1·07	1·04	1·00	0·95	0·90	0·85	1·10	1·05	1·00	0·93	0·86	0·82
16	1·08	1·04	1·00	0·94	0·89	0·84	1·10	1·05	1·00	0·92	0·86	0·81
25	1·08	1·04	1·00	0·94	0·88	0·83	1·10	1·05	1·00	0·92	0·85	0·80
35	1·09	1·05	1·00	0·94	0·87	0·83	1·11	1·06	1·00	0·92	0·85	0·80
50	1·09	1·05	1·00	0·94	0·87	0·83	1·12	1·06	1·00	0·92	0·85	0·80
70	1·09	1·05	1·00	0·94	0·87	0·83	1·12	1·06	1·00	0·91	0·85	0·79
95	1·10	1·05	1·00	0·93	0·86	0·82	1·13	1·06	1·00	0·91	0·84	0·79
120	1·10	1·05	1·00	0·92	0·85	0·81	1·13	1·06	1·00	0·91	0·84	0·78
150	1·10	1·05	1·00	0·92	0·85	0·81	1·14	1·07	1·00	0·91	0·84	0·78
185	1·10	1·05	1·00	0·92	0·85	0·80	1·15	1·08	1·00	0·91	0·84	0·77
225	1·10	1·05	1·00	0·92	0·85	0·80	1·15	1·08	1·00	0·91	0·84	0·77
240	1·11	1·06	1·00	0·92	0·85	0·80	1·15	1·08	1·00	0·91	0·83	0·77
300	1·12	1·06	1·00	0·92	0·85	0·80	1·15	1·08	1·00	0·90	0·83	0·76
400	1·12	1·06	1·00	0·91	0·85	0·79	1·16	1·08	1·00	0·90	0·83	0·76
500	1·12	1·06	1·00	0·91	0·85	0·79	1·16	1·08	1·00	0·90	0·82	0·76
625	1·13	1·06	1·00	0·91	0·84	0·79	1·17	1·09	1·00	0·90	0·82	0·76

TABLE 34 RATING FACTORS FOR MULTI-WAY DUCTS (FOR USE WHEN A MULTI-WAY DUCT DOES NOT CONTAIN THE FULL NUMBER OF LOADED ARMOURED CABLES)

[*Clauses* 0.4 *and* 5.1 (b) (iv)]

Number of Loaded Cables in					
3-Way Duct		6-Way Duct		9-Way Duct	
1	2	4	5	7	8
1·15	1·07	1·10	1·04	1·10	1·05

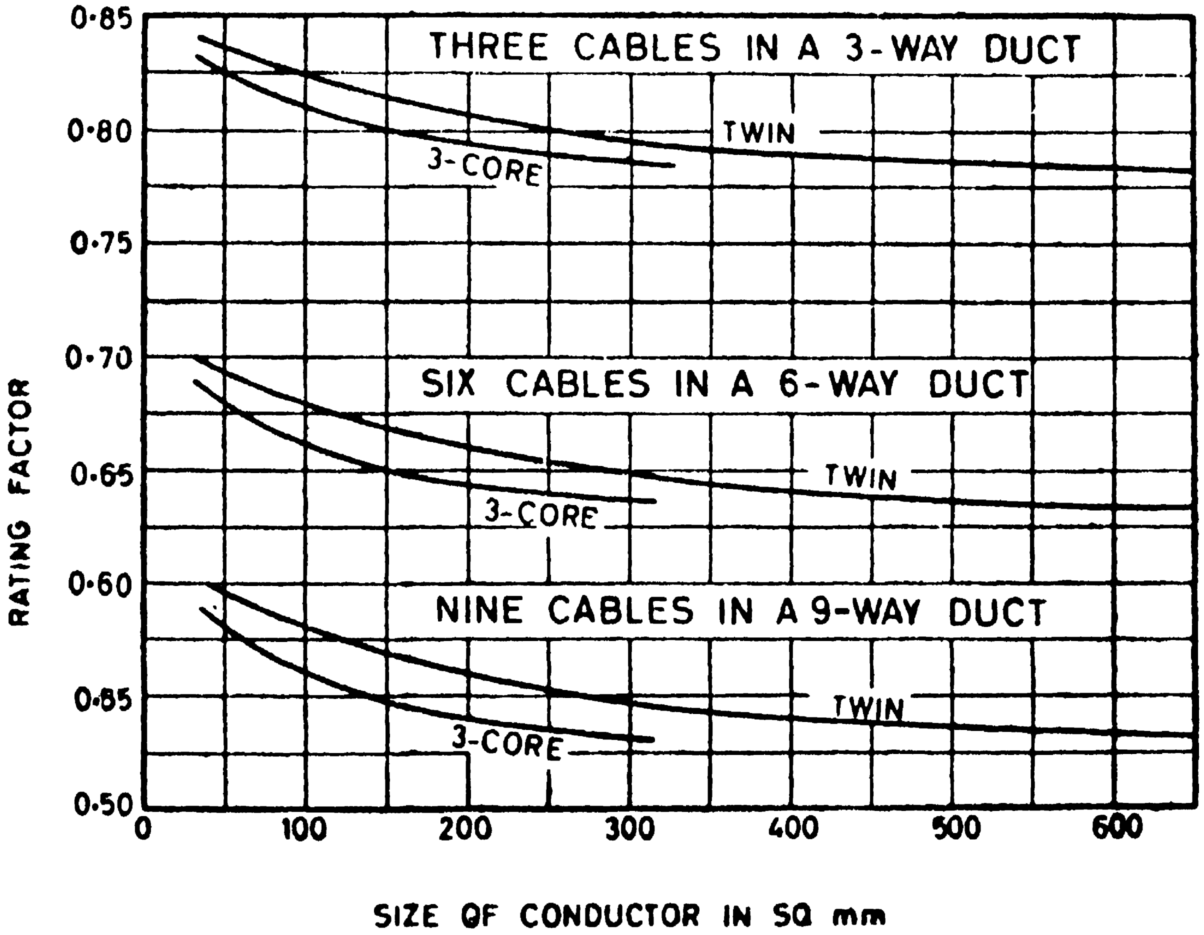


FIG. 1 RATING FACTORS FOR WIRE-ARMOURED CABLES IN MULTI-WAY DUCTS (TO BE APPLIED TO RATING OF CORRESPONDING CABLE IN A SINGLE-WAY DUCT TO OBTAIN RATING FOR CABLE IN MULTI-WAY DUCT)

TABLE 35 GROUP RATING FACTORS FOR TWIN AND MULTI-CORE CABLES IN SINGLE-WAY STONEWARE DUCTS AND IRON PIPES IN TIER FORMATION

[*Clause* 5.1 (b) (v)]

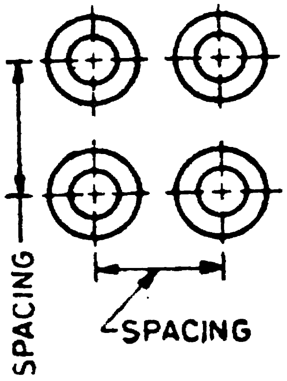
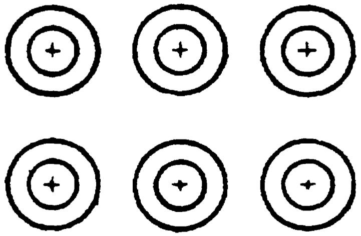
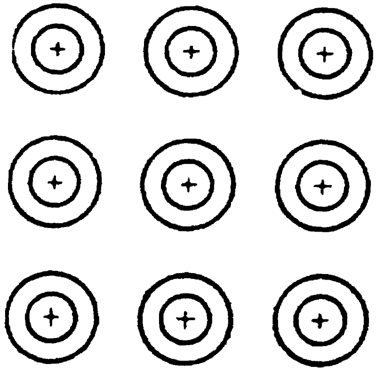
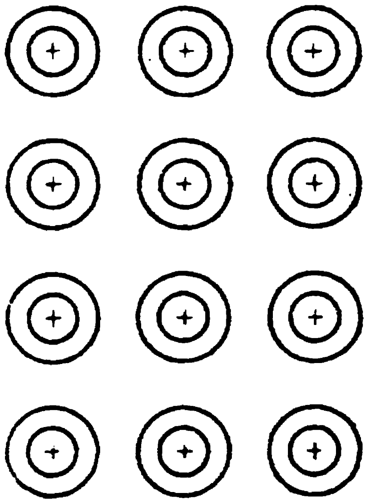
								
Spacing of Ducts (Pipes) cm	Up to 22 kV	33 kV	Up to 22 kV	33 kV	Up to 22 kV	33 kV	Up to 22 kV	33 kV
Approximate touching	0·76	0·70	0·67	0·60	0·58	0·51	0·54	0·46
30	0·79	0·73	0·71	0·64	0·61	0·55	0·57	0·50
45	0·81	0·76	0·74	0·67	0·63	0·58	0·60	0·53

TABLE 36 GROUP RATING FACTORS FOR SINGLE-CORE CABLES IN TREFOIL STONEWARE DUCTS IN TIER FORMATION

[*Clause* 5.1 (b) (v)]

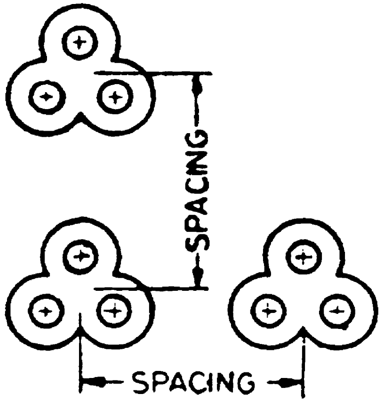
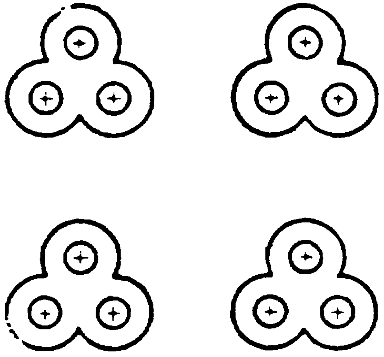
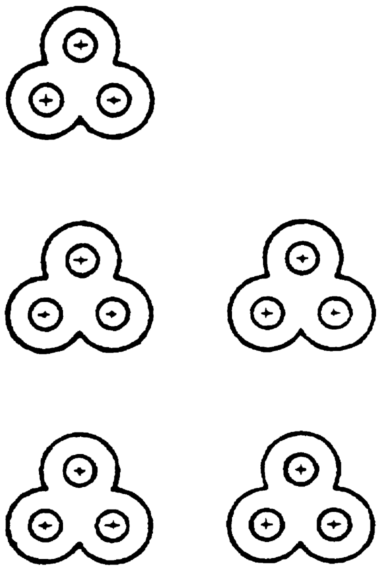
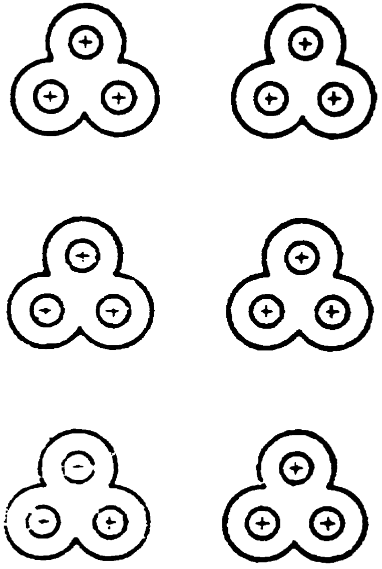
								
Spacing of Ducts cm	Up to 22 kV	33 kV	Up to 22 kV	33 kV	Up to 22 kV	33 kV	Up to 22 kV	33 kV
Approximate touching	0·76	0·71	0·70	0·65	0·64	0·59	0·61	0·55
45	0·78	0·76	0·73	0·70	0·67	0·63	0·64	0·60

TABLE 37 GROUP RATING FACTORS FOR TWIN AND MULTI-CORE CABLES IN SINGLE-WAY DUCTS AND PIPES, IN HORIZONTAL FORMATION

[*Clause* 5.1 (b) (v)]

Number of Ducts in Group	Spacings for Cables							
	1·1 kV to 22 kV				33 kV			
	Touching	30 cm	45 cm	60 cm	Touching	30 cm	45 cm	60 cm
2	0·88	0·90	0·92	0·94	0·86	0·89	0·90	0·92
3	0·82	0·84	0·87	0·89	0·77	0·80	0·83	0·85
4	0·77	0·80	0·84	0·87	9·72	0·76	0·80	0·82
5	0·74	0·78	0·82	0·85	0·68	0·72	0·77	0·80
6	0·71	0·76	0·81	0·84	0·65	0·70	0·75	0·78
7	0·69	0·74	0·79	0·83	0·62	0·68	0·73	0·77
8	0·67	0·73	0·78	0·82	0·60	0·66	0·72	0·76
9	0·66	0·72	0·77	0·82	0·59	0·65	0·70	0·75
10	0·65	0·71	0·77	0·81	0·57	0·64	0·70	0·74
11	0·64	0·70	0·76	0·81	0·56	0·63	0·69	0·74
12	0·63	0·69	0·76	0·81	0·55	0·62	0·68	0·73

TABLE 38 GROUP RATING FACTORS FOR SINGLE-CORE CABLES IN TREFOIL DUCTS, HORIZONTAL FORMATION

[*Clause* 5.1 (b) (v)]

Number of Ducts in Group	Spacings for Cables					
	1·1 kV to 22 kV			33 kV		
	Touching	45 cm	60 cm	Touching	45 cm	60 cm
2	0·87	0·90	0·91	0·83	0·86	0·88
3	0·79	0·83	0·86	0·72	0·78	0·80
4	0·74	0·79	0·82	0·67	0·73	0·77
5	0·71	0·76	0·80	0·62	0·69	0·73
6	0·69	0·74	0·78	0·60	0·67	0·71
7	0·67	0·72	0·77	0·57	0·65	0·70
8	0·65	0·71	0·76	0·55	0·64	0·68
9	0·64	0·70	0·75	0·54	0·63	0·67
10	0·63	0·70	0·75	0·53	0·62	0·67
11	0·62	0·69	0·75	0·51	0·61	0·66
12	0·62	0·68	0·75	0·50	0·60	0·65

TABLE 39 RATING FACTORS FOR THREE* UNARMOURED SINGLE-CORE CABLES (ac) IN FLAT FORMATION IN AIR (TO BE APPLIED TO THE CORRESPONDING RATING FOR TREFOIL GROUPS IN AIR)

[*Clause* 5.1 (c) (i)]

NOMINAL AREA OF CONDUCTOR	1·1 kV TO 11 kV INCLUSIVE		22 AND 33 kV	
	Transposed	Untransposed	Transposed	Untransposed
mm² Up to and Including				
185	1·08	1·07	1·08	1·07
225	1·11	1·10	1·05	1·04
240	1·11	1·10	1·05	1·04
300	1·10	1·08	1·05	1·03
400	1·08	1·04	1·04	1·00
625	1·06	1·00	1·03	0·97

*Applicable also to four cables carrying three phases and neutral.

TABLE 40 RATING FACTORS FOR VARIATION IN AMBIENT AIR TEMPERATURE

[*Clause* 5.1 (c) (ii)]

MAXIMUM CONDUCTOR TEMPERATURE	AIR TEMPERATURE °C				
	25	30	35	40	45
°C					
80	1·19	1·12	1·06	1·00	0·92
70	1·25	1·16	1·09	1·00	0·90
65	1·30	1·21	1·10	1·00	0·88

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Kalaikathir Buildings, 670 Avinashi Road, COIMBATORE 641037	21 01 41
Plot No. 43, Sector 16 A, Mathura Road, FARIDABAD 121001	8-28 88 01
Savitri Complex, 116 G.T. Road, GHAZIABAD 201001	8-71 19 96
53/5 Ward No. 29, R.G. Barua Road, 5th By-lane, GUWAHATI 781003	54 11 37
5-8-56C, L.N. Gupta Marg, Nampally Station Road, HYDERABAD 500001	20 10 83
E-52, Chitaranjan Marg, C-Scheme, JAIPUR 302001	37 29 25
117/418 B, Sarvodaya Nagar, KANPUR 208005	21 68 76
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NIT Building, Second Floor, Gokulpat Market, NAGPUR 440010	52 51 71
Patliputra Industrial Estate, PATNA 800013	26 23 05
Institution of Engineers (India) Building 1332 Shivaji Nagar, PUNE 411005	32 36 35
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